Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Space Exploration Holdings, LLC	)	IBFS File No. SAT-MOD-20200417-00037
Request for Modification of the Authorization for the SpaceX NGSO Satellite System	)	Call Signs S2983 and S3018

VIASAT, INC.'S
REQUEST FOR STAY PENDING JUDICIAL REVIEW

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Pursuant to 47 C.F.R. §§ 1.41 and 1.43, Viasat, Inc. (Viasat) respectfully requests that the Commission stay the effectiveness of its order granting SpaceX's application to modify its Ku/Ka-band satellite system, which was released on April 27, 2021 (Order), pending judicial review of that Order in the D.C. Circuit. The Commission has violated the National Environmental Policy Act (NEPA) by failing even to *assess* the environmental impact of both deploying thousands of satellites into low-Earth orbit (LEO) and then having those satellites ultimately disintegrate into the atmosphere. Because the Order will allow SpaceX to cause immediate and irreparable harm to Viasat and the public at large, the Commission should stay the Order until judicial review is complete. If the Commission does not grant a stay, Viasat intends to seek a stay from the D.C. Circuit. Accordingly, Viasat respectfully requests that the Commission rule on this request by June 1, 2021; if it does not, Viasat will deem the request denied.

INTRODUCTION AND SUMMARY

The Order authorizes SpaceX to deploy satellites into LEO at an unprecedented scale—but without even the most basic form of environmental review. That is a legal error, and the court of appeals is likely to correct it. The Commission should not allow SpaceX to rush its satellites into orbit while the D.C. Circuit is deciding whether the Commission wrongly skipped the environmental review that is statutorily required *before* a federal action that may affect the environment.

In the history of human space exploration, humans have launched approximately 9,000 satellites into space. SpaceX satellites already account for nearly two thousand of these. The Order authorizes SpaceX to deploy 2,824 *additional* operating satellites into LEO, plus an unlimited number of replacements. And even those satellites are only one step in SpaceX's plan to deploy a mega-constellation initially consisting of more than 12,000 operating satellites, and ultimately comprising more than 42,000 operating satellites. Whatever the benefits of this new form of mega-constellation, it plainly poses significant risks to the environment. By design, each of SpaceX's satellites will ultimately disintegrate into the atmosphere, collectively leaving behind millions of pounds of metallic compounds that could increase global warming. While in space, its satellites will reflect sunlight, increasing light pollution and altering the night sky. And there is a serious risk that these satellites will collide—either with each other, satellites operated by third parties, or with existing space debris. Such collisions will fragment the satellites, spread dangerous additional debris throughout surrounding orbits, and adversely affect the ability of others to traverse, and operate in, LEO.

NEPA requires that the Commission at least *consider* these harms before granting SpaceX's application. NEPA instructs the Commission, like all other "agencies of the Federal Government," to include "a detailed statement" regarding the environmental impact on any

major action "significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). Under the Commission's NEPA regulations, if an "interested person" alleges that a Commission action will have such an effect, the Commission "*will require* the applicant to prepare an [Environmental Assessment]" (EA) if the action "*may* have a significant environmental impact." 47 C.F.R. § 1.1307(c) (emphases added). This procedural requirement "places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action," hence "ensur[ing] fully informed and well-considered decisionmaking." *WildEarth Guardians v. Jewell*, 738 F.3d 298, 303 (D.C. Cir. 2013) (internal quotation marks omitted).

The Commission here refused to follow that statutory and regulatory obligation and approved SpaceX's application without the "well-considered decisionmaking" NEPA requires. Viasat and others explained, through hundreds of pages of briefing and more than 1,500 pages of exhibits, that launching thousands of satellites into LEO at the very least may impact the environment, because those satellites create collision risks and threaten to pollute the orbital environment, reflect light and otherwise undermine opportunities to explore and enjoy the night sky, and will ultimately disintegrate into the atmosphere on reentry. These consequences warrant at least an environmental assessment (EA) before making a decision. Yet the Commission did not even require SpaceX to prepare an EA, the most basic analysis under NEPA. Instead, largely ignoring Viasat's arguments and evidence, the Commission concluded that SpaceX's unprecedented deployment of thousands of satellites did not even create the *potential* for a significant environmental impact. The D.C. Circuit is likely to set aside that decision. The Commission's scant reasoning on this point is inadequate, and the few reasons the Commission gave directly conflict with binding D.C. Circuit precedent criticizing the

Commission's past failures to comply with NEPA.

Given the Commission's failure to follow NEPA's most basic requirements, the agency should stay its Order to avert the immediate and irreparable harm to Viasat and the public from allowing SpaceX to deploy satellites under the Order during the pendency of the appeal. SpaceX is deploying hundreds of satellites *per month*. Once those satellites go up, they cannot be deorbited without leaving harmful metallic compounds in the atmosphere, thereby harming the environment—precisely the conduct NEPA is designed to prevent. And while they stay up, they pose a threat to Viasat and other satellite operators. The more satellites SpaceX launches, the greater the risk of catastrophic collisions—the debris from which would endanger the orbits available for Viasat's satellite operations, and through which Viasat's satellites must pass during orbit raising and deorbiting operations. Indeed, Viasat is authorized to deploy its own non-geostationary orbit ("NGSO") satellite network and has a pending application to relocate that network to LEO. Finally, each satellite that SpaceX deploys will increase light pollution while in orbit, adversely impacting efforts to explore and enjoy the night sky.

Before allowing these harms to occur, the Commission should allow the D.C. Circuit to review the Order for compliance with NEPA.

LEGAL STANDARD

When evaluating a request for a stay pending appeal, the Commission considers four criteria: "(1) a likelihood of success on the merits, (2) the threat of irreparable harm absent the grant of preliminary relief, (3) the degree of injury to other parties if relief is granted, and (4) that a stay will be in the public interest."[1] "These factors are balanced on a case-by-case basis and a

[1] In the Matter of Hyperion Commc'ns Long Haul, L.P., *Order Granting Request for Emergency Stay*, 15 FCC Rcd. 10,202, 10,203 (2000) (citing *Va. Petroleum Jobbers Ass'n v. FPC*, 259 F.2d 921, 925 (D.C. Cir. 1958)).

request for stay may be granted on account of a particularly strong showing as to at least one of the factors, regardless of an absence of showing of another factor."[2]

ARGUMENT

All four factors weigh in favor of a stay, especially in light of the likely wide-ranging effects of SpaceX's Starlink project and the "compelling public interest in the enforcement of NEPA."[3]

I. The D.C. Circuit is likely to hold that the Commission failed to comply with NEPA.

Viasat identified, and documented in thousands of pages of exhibits, multiple environmental effects that SpaceX's Starlink mega-constellation would cause over the 15-year term of SpaceX's NGSO system license. Satellite launch and reentry will release harmful metallic compounds, threatening increases in ozone depletion and contributions to global warming. The satellites' significant contribution to light pollution will interfere with scientific work and enjoyment of the night sky. And the dramatic increase in the number of objects in LEO will significantly elevate the risk of collisions, which in turn would create debris that threatens harm in space and on Earth. Despite the scientific evidence identifying and substantiating these consequences, the Order concluded that there was not even a *potential* for a significant environmental impact, and refused to conduct *any* environmental assessment.

The D.C. Circuit is likely to vacate the Order for failing to comply with NEPA. When issuing a decision, an "agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice

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[2] *Id.*; *see also* AT&T v. Ameritech, *Memorandum Opinion and Order*, 13 FCC Rcd. 14,508, 14,516 n.43 (1988) ("We find no due process requirement that any single factor, such as irreparable injury to the moving party, be demonstrated as a prerequisite to issuance of a standstill order.").

[3] *Realty Income Tr. v. Eckerd*, 564 F.2d 447, 456 (D.C. Cir. 1977).

made."[4] Agency action will be found "arbitrary and capricious" if the agency "relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise."[5] In short, "[w]here … the record belies the agency's conclusion, [the Court] must undo its action."[6]

Applying these principles, the D.C. Circuit is likely to reject the Commission's conclusion that NEPA does not require *any* environmental assessment in this case—indeed, the Order contains many of the precise errors that led the D.C. Circuit to vacate the Commission's order in *American Bird Conservancy, Inc. v. FCC*.[7] The Commission's analysis contained two overarching errors: It failed to adequately explain its conclusion and, to the extent it did, erroneously relied on *uncertainty* as a basis for *refusing* further analysis, which is exactly the opposite of what NEPA requires. Moreover, the Commission's bases for rejecting Viasat's specific claims of potential environmental harm do not withstand even minimal scrutiny.

A. The Order did not adequately explain the Commission's conclusion and erroneously relied on uncertainty as a reason to *refuse* further assessment.

Viasat's NEPA petition was supported by more than 1,500 pages of exhibits and more than 100 pages of briefing, yet the Commission addressed the NEPA issues in just a few cursory sentences. The Commission largely rested on its conclusion that Viasat's evidence left some

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[4] *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

[5] *Id.*; *see also Nevada v. Dep't of Energy*, 457 F.3d 78, 87-88 (D.C. Cir. 2006) ("[W]e apply the APA's arbitrary and capricious standard to a NEPA challenge.").

[6] *County of Los Angeles v. Shalala*, 192 F.3d 1005, 1021 (D.C. Cir. 1999).

[7] 516 F.3d 1027, 1033-1034 (D.C. Cir. 2008).

uncertainty concerning the environmental impact of SpaceX's proposed mega-constellation. That "plainly contravenes the 'may' standard" of NEPA.[8] As the D.C. Circuit explicitly held in *American Bird Conservancy*, uncertainty "confirms, rather than refutes," the need for environmental analysis because a "precondition of certainty before initiating NEPA procedures would jeopardize NEPA's purpose to ensure that agencies consider environmental impacts before they act rather than wait until it is too late."[9] Indeed, in that decision, the D.C. Circuit "admonish[ed]" the Commission for its decision to forge ahead where the environmental effects of its action were not "fully known."[10]

Beyond that brief and erroneous reasoning in the Order, the Commission's discussion was so cursory as to violate "[o]ne of the basic procedural requirements of administrative rulemaking"—the obligation to adequately explain its decision.[11] The bulk of the Order's discussion of NEPA was devoted to summaries of the parties' arguments, but the Commission's obligation was to explain not just the possible choices but "the choice made."[12] In response to one of Viasat's lead arguments, for example, the Commission responded: "[W]e find that the allegations Viasat makes in its petition are insufficient for us to determine that additional environmental consideration is necessary under our rules or that granting the SpaceX modification application may have a significant environmental impact on the atmosphere or ozone layer." Order ¶ 83. That is the Commission's *entire* analysis of that issue—and it is plainly inadequate to permit meaningful review by the D.C. Circuit.

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[8] *American Bird Conservancy*, 516 F.3d at 1033.

[9] *Id.* at 1033-1034.

[10] *Id.* at 1033 (citation omitted).

[11] *Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2125 (2016).

[12] *Id.* (quoting *State Farm*, 463 U.S. at 43).

As shown in more detail below, these failings—misapplication of the "may" standard and cursory explanation—fatally undermine the Commission's treatment of each of the environmental impacts Viasat identified.

B. Viasat is likely to succeed in showing that potential harms to the atmosphere warrant NEPA review.

Turning to the specific environmental harms at issue, Viasat's arguments and exhibits established, at a minimum, that chemical changes to the atmosphere resulting from launch and reentry of many thousands of Starlink satellites *may* have a significant environmental impact, thus satisfying 47 C.F.R. § 1.1307(c). The Commission refused to conduct further environmental assessments only by (1) applying a heightened NEPA standard that the D.C. Circuit has repeatedly rejected, and (2) failing to account for entire categories of environmental impact.

1. The Commission improperly dismissed Viasat's evidence as insufficiently certain.

As SpaceX itself touts, approval of its Starlink mega-constellation will lead to the launch and ultimate decay of thousands of satellites. Indeed, the whole premise of Starlink is to create a system of essentially disposable satellites that will regularly burn up in the atmosphere—only to be replaced by new, similarly disposable satellites. Of course, when satellites burn up in the atmosphere, they do not simply vanish. Instead, the largely aluminum satellites produce aluminum oxide, or "alumina," which remains in the atmosphere.[13] Researchers have predicted that the reentry of satellite constellations (including satellites from Starlink) could lead to over 22

[13] *See* Application for Modification of Authorization for SpaceX NGSO Satellite System, Attachment A, at 24, IBFS File No. SAT-MOD-20200417-00037 (Apr. 17, 2020).

million pounds of alumina being dispersed in the atmosphere at a given point in time.[14] And given the size of Starlink relative to other satellite constellations, its satellites' short lifetimes, and their largely aluminum construction, those researchers predict that Starlink will be the dominant contributor of that alumina.[15] Because alumina absorbs more radiation from Earth than it reflects from the sun, this mass of alumina may lead to warming of the stratosphere, and likely the upper troposphere—which, of course, contributes to climate change.[16] Alumina also damages the ozone layer by providing a surface for chemical reactions that contribute to ozone depletion—contributing, for example, to the creation of the "Ozone Hole" over the Antarctic.[17] And Viasat's evidence shows that SpaceX's operations may harm the ozone layer in other respects, through the release of other chemicals during launches.[18]

The Commission did not dispute that SpaceX's proposal to demise thousands of aluminum-based satellites into the atmosphere will "affect the chemicals entering the atmosphere." Order ¶ 82. But the Commission nevertheless concluded that Viasat's evidence did not establish, with sufficient certainty, "that additional environmental consideration is necessary." Order ¶ 82. The D.C. Circuit, however, has previously vacated the Commission's orders for refusing to conduct a NEPA analysis on precisely this ground. In *American Bird Conservancy*, the Commission dismissed a request to conduct an EIS based on "the lack of specific evidence … concerning the impact" that communications towers would have on the environment, and specifically whether the towers would increase bird mortality rates stemming

[14] *See* Ex. 15 to Viasat NEPA Petition.

[15] *Id.*

[16] *See* Ex. 14 to Viasat NEPA Pet. at 193; Viasat Pet. 11-12.

[17] *See* Ex. 12 to Viasat NEPA Pet. at 54.

[18] *See* Ex. 12 to Viasat NEPA Pet. at 52.

from collisions with the towers.[19] On appeal, the D.C. Circuit characterized the Commission's reasoning as revealing "an apparent misunderstanding of the nature of the obligation imposed by the statute."[20] The Commission's "demand for definitive evidence of significant effects," the court explained, "plainly contravenes the 'may' standard" in 47 C.F.R. § 1.1307(c).[21] The court thus "admonished" the Commission that "the basic thrust of the agency's responsibilities under NEPA is to predict the environmental effects of a proposed action before the action is taken and those effects [are] fully known"—making *uncertainty* an impermissible basis for *refusing* additional environmental assessment.[22]

The Commission repeated this same error here, though with even less reasoning than it provided in *American Bird Conservancy*. As the D.C. Circuit's opinion in *American Bird Conservancy* makes clear, the Commission cannot demand definitive evidence of environmental impact *before* conducting the environmental analysis intended to gather such evidence. Rather, the question is whether the Commission's action *may* lead to an environmental impact that the agency should explore. And Viasat provided ample evidence to show that decay of SpaceX's satellites *may* increase the level of alumina in the atmosphere and lead to warming of the atmosphere and destruction of the ozone layer. Notably, SpaceX did not dispute that satellite reentry would lead to an increase in alumina in the atmosphere, but rather quibbled about the precise amount of alumina its satellites would produce.[23] But to the extent there is a dispute over

[19] 516 F.3d at 1033.

[20] *Id.* at 1033.

[21] *Id.*

[22] *Id.* (quoting *Scientists' Inst. For Pub. Info., Inc. v. Atomic Energy Comm'n*, 481 F.2d 1079, 1091-92 (D.C. Cir. 1973)).

[23] *See* SpaceX Apr. 2 Letter at 5.

just how large an effect the alumina would have, that is plainly a matter the Commission needs to consider *through an EA*. Indeed, the D.C. Circuit held precisely that in *American Bird Conservancy*, explaining that conflicting evidence over the scope of an environmental impact "confirms, rather than refutes" that NEPA review is appropriate.[24]

The Commission took a similar tack in sidestepping the remainder of Viasat's evidence of harms to the atmosphere. The Commission dismissed as "vague" Viasat's evidence surrounding the release of other chemical compounds, Order ¶ 82, without addressing the research Viasat cited, which suggests that "particles from reentering space junk will be a zoo of complex chemical types"; "[r]eentry is as much of an 'emission' as launch"; and "[v]ery little is known about reentry dust production, the microphysics of the parties and how reentry dust could affect climate and ozone."[25] In light of evidence from leading researchers suggesting that very large numbers of satellite reentries *may* have significant environmental effects, the proper response for the Commission was to conduct an assessment—not to demand certainty *from Viasat*.[26] After all, "speculation is … implicit in NEPA," and the D.C. Circuit has thus "reject[ed] any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry.'"[27]

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[24] 516 F.3d at 1034 ("Under such circumstances, the Commission's regulations mandate at least the completion of an EA before the Commission may refuse to prepare a programmatic EIS.").

[25] Martin N. Ross & Leonard David, *An Underappreciated Danger of the New Space Age: Global Air Pollution*, Sci. Am. (Nov. 6, 2020), https://www.scientificamerican.com/article/an-underappreciated-danger-of-the-new-space-age-global-air-pollution/.

[26] *See Greater Yellowstone Coal. v. Lewis*, 6287 F.3d 1143, 1158 (9th Cir. 2010) (describing NEPA as a "look before you leap" regime).

[27] *Scientists' Institute for Public Information*, 481 F.2d at 1092.

2. The Commission did not address entire categories of environmental impact.

In addition to dismissing Viasat's evidence, the Commission also "entirely failed to consider an important aspect of the problem"—twice.[28] First, the Commission simply did not evaluate whether the substantial number of rocket launches needed to deploy SpaceX's thousands of satellites might themselves affect atmospheric ozone levels. Because the FAA "prepared its own EA on the SpaceX launches," the FCC concluded that "no additional consideration of potential impacts associated with those launches is required." Order ¶ 82.[29] But the FAA's assessment was limited to two discrete categories of potential effects on the atmosphere: the effects of launches on air quality *below 3,000 feet* and the effects of greenhouse gas emissions from launches on climate change.[30] The FAA did not conduct a comprehensive evaluation of how launch emissions affect stratospheric chemistry, nor did it consider the effect that these launches might have on depletion of the ozone layer.[31] The Commission never considered whether these missing pieces might warrant an EA, instead relying entirely on the FAA's incomplete assessment.

Second, the Commission did not consider the harm that might result from satellite debris that does *not* fully burn up in the atmosphere. Instead, the Commission explained that it had already "assessed the casualty risk associated with the SpaceX satellites" when it considered "technical information" SpaceX submitted "concerning the demisability of its satellites" in its

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[28] *State Farm*, 463 U.S. at 43.

[29] *See also* SpaceX Apr. 2 Letter at 5.

[30] *Final Environmental Assessment and Finding of No Significant Impact for SpaceX Falcon Launches at Kennedy Space Center and Cape Canaveral Air Force Station*, at 70-72, FAA (July 2020), https://www.faa.gov/space/environmental/nepa_docs/media/SpaceX_Falcon_Program_Final_EA_and_FONSI.pdf.

[31] *See* Ex. 12 to Viasat NEPA Pet. at 52.

initial April 26, 2019 modification request. Order ¶ 85. Because, in the Commission's view, "there is no material difference between those satellites and the satellites at issue here," it declined to revisit this issue. *Id.*

The Commission is wrong twice over. To start, even assuming the Commission's premise that the satellites evaluated in connection with SpaceX's earlier modification request and the satellites at issue here are effectively equivalent, the Commission ignored what SpaceX's "technical information" actually said. Far from dismissing any casualty risk, the information SpaceX provided identifies "three unique components" that "may have a chance of reaching the Earth's surface with sufficient energy to result in human casualty," [32] not to mention potential damage to wildlife and the natural environment. SpaceX in fact recognized as much, as it explained to FCC that its future satellite designs would either omit or replace these components.[33] Thus, evidence the Commission cited in fact establishes that the Commission *should* have assessed the acknowledged potential that components from SpaceX's satellites could reach the Earth with sufficient force to kill someone.

Even putting that aside, the Commission's premise is wrong: There is no basis for treating the previously-evaluated satellites and the satellites at issue here as equivalent as to their demisability. The preliminary evaluation on which the Commission relied was focused on an older generation of SpaceX satellites—an evaluation that did not even require SpaceX to provide the high-fidelity evaluation that the Commission requested. Nothing in the record establishes

[32] Attachment A: Technical Information to Supplement Schedule S at 45-48, IBFS File No. SAT-MOD-20181108-00083 (Nov. 8, 2018); *see also* Viasat NEPA Reply at 27.

[33] Letter from William M. Wiltshire, Counsel to SpaceX, to Jose P. Albuquerque, Chief, Satellite Div., Int'l Bureau, FCC at 5, IBFS File No. SAT-MOD-20181108-00083 (Mar. 13, 2019).

that the new satellites are materially equivalent to the old ones with respect to demisability.[34] The data in the record shows that SpaceX's old satellites were *not* fully demisable, yet the Commission did not so much as acknowledge that the current application involves satellites with a different design and different components.

C. Viasat is likely to succeed in showing that potential harms from light pollution and astronomical interference warrant NEPA review.

The Commission's analysis of whether SpaceX's satellites may cause an environmental impact is equally flawed as to light pollution and astronomical interference. Viasat provided extensive evidence, in the form of both photographs and scientific data, showing that deploying thousands of satellites *may*—and almost certainly will—significantly affect the environment through a marked increase in light pollution.[35] Based on this evidence, Viasat identified four potential environmental harms.

First, increased light pollution substantially interferes with astronomical observation. As the number of satellites in LEO grows, so too does the amount of light pollution, with a concomitant increase in "the potential for substantial adverse impacts to ground- and space-based astronomy."[36] Viasat presented evidence—principally from professional astronomers—showing

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[34] Letter from William M. Wiltshire, Counsel to SpaceX, to Jose P. Albuquerque, Chief, Satellite Div., Int'l Bureau, FCC at 5, IBFS File No. SAT-MOD-20181108-00083 (Mar. 13, 2019); Attachment A: Technical information to Supplement Schedule S at 45-48, IBFS File No. SAT-MOD-20181108-00083 (Nov. 8, 2018); *see also* Viasat NEPA Reply at 26.

[35] *See* Viasat NEPA Pet. at 16-21; Exs. 18-24 to Viasat NEPA Pet.; Viasat NEPA Reply at 27-35; Ex. 12-14 to Viasat NEPA Reply; Viasat Apr. 16 Letter at 4-6.

[36] Am. Astronomical Soc'y, *AAS Issues Position Statement on Satellite Constellations* (June 10, 2019), https://aas.org/press/aas-issues-position-statement-staelliteconstellations; *see also* Royal Astronomical Soc'y, *RAS Statement on Starlink Satellite Constellation* (June 7, 2019), http://ras.ac.uk/news-andpress/news/ras-statement-starlink-satellite-constellation; Int'l Astronomical Union, *IAU Statement on Satellite Constellations* (June 3, 2019), http://www.iau.org/news/announcements/detail/ann19035/.

that an extensive satellite constellation like Starlink will have "significant negative [astronomical] impacts" and "increase significantly" background skyglow, making it difficult both to observe and to take photographs.[37] For instance, professional astronomer Dr. Andy Lawrence wrote that Starlink satellites pose a "[t]hreat to astronomical science" and "regularly 'photobomb[]' observations from both the ground and from space."[38]

Second, Viasat explained to the Commission that it is not just the size of SpaceX's satellite constellation that creates unique concerns, but its orbital altitudes as well. To an observer on Earth, satellites appear brighter at lower altitudes because they are closer.[39] And that increased brightness occurs specifically during astronomical and nautical twilight—an "important time for key classes of astronomical observations, such as the detection and characterization of comets, interstellar objections, and near-earth observations."[40] The low altitudes of SpaceX's satellites thus exacerbates their light-polluting effect.

Third, Viasat cited numerous studies showing that the Commission's approval would "significantly affect the quality of the human environment" by creating aesthetic, scientific, social, cultural, and health effects resulting from an increase in light pollution.[41] These studies included three separate scientific articles and a report from the United Nations documenting light pollution's negative effects in areas ranging from human health (including sleep disruption and

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[37] *See* Ex. 19 to Pet. at 3; M. Kocifaj et al., *The Proliferation of Space Objects Is a Rapidly Increasing Source of Artificial Night Sky Brightness* 5 (2021); Viasat Apr. 16 Letter at 5 n.22.

[38] Letter from Dr. Andy Lawrence to Ms. Marlene H. Dortch, Secretary, FCC at 1, IBFS File No. SAT-MOD-20200417-00037 (Apr. 21, 2021).

[39] *See* Ex. 18 to Viasat NEPA Pet. at 5-8.

[40] Ex. 13 to Viasat NEPA Reply at 147.

[41] Viasat NEPA Pet. at 16-19.

eye disorders) to animal migratory patterns.[42]

Fourth, Viasat identified concerns about the effects that the Commission's order would have on radiofrequency astronomy. As the Commission itself has recognized, satellite signals "can cause interference to radio astronomy observations," thereby interfering with critical scientific research.[43]

Notably, the Commission did not dispute *any* of these potential environmental impacts. To the contrary, the Commission acknowledged the potential for such impacts and then simply brushed them aside by pointing to steps SpaceX has purportedly taken to mitigate them. The Commission was satisfied with SpaceX's "representation[s]" that it had "diminished the average brightness of its satellites," "made commitments to the astronomy community regarding further reduction in the visibility of its satellites," and entered into an agreement with the National Science Foundation to limit radio interference. Order ¶ 87.[44] But the fact that SpaceX's environmental impact *would be even bigger* absent mitigation does not absolve the agency from evaluating the impact that undisputedly will still occur. In other words, SpaceX's claimed mitigation may be a factor that could be considered as *part* of an EA, but it is not a basis for refusing to prepare an EA *at all*. Moreover, Viasat presented extensive evidence showing that SpaceX's alleged mitigation efforts have *not* solved the scientific community's concerns about light pollution and radio interference—arguments the Commission simply ignored.[45]

Even putting that aside, the Commission's decision once again fails for lack of reasoning.

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[42] *See* Exs. 21-23 to Viasat NEPA Pet.; Ex. 13 to Viasat NEPA Reply.

[43] *Space Expl. Holdings, LLC*, 33 FCC Rcd. 3391, 3399 (2018).

[44] *See also* National Science Foundation, *Statement on NSF and SpaceX Radio Spectrum Coordination Agreement* (June 4, 2019), https://www.nsf.gov/news/news_sum.jsp?cntnid=298678.

[45] Ex. 13 to Viasat NEPA Reply at 30; Viasat NEPA Reply at 31.

As discussed above, *see* p. 7, *supra*, an agency must "adequately explain" its decision by "examin[ing] the relevant data and articulat[ing] a satisfactory explanation for its action including a rational connection between the facts found and the choice made."[46] The Commission failed to do so here. Rather than engage with the evidence, it simply noted SpaceX's progress towards reducing light pollution, instructed SpaceX to maintain those efforts, and then promised to keep monitoring the situation. Nowhere did the Commission explain why Viasat's dozens of studies, articles, and letters from professional astronomers failed to show that SpaceX's constellation *may* have a significant environmental impact. To the contrary, the evidence compelled the Commission to continue "monitoring" the light pollution issue—a step that would be necessary only if light pollution might pose harms.

D. Viasat is likely to succeed in showing that increasing orbital debris warrants NEPA review.

Finally, Viasat demonstrated that SpaceX's satellite constellation may affect the environment by increasing the amount of orbital debris. It is undisputed that some number of SpaceX's satellites will fail during its license term (indeed, many already have).[47] As the Commission itself explained, satellites that fail "present a collision risk for as long as they remain in orbit." Order ¶ 62. The Commission recognized that the number of failed satellites might reach into the *hundreds*. Order ¶¶ 61-63. And because SpaceX is launching its thousands

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[46] *State Farm*, 463 U.S. at 43; *see also Van Hollen, Jr. v. FEC*, 811 F.3d 486, 497 (D.C. Cir. 2016).

[47] *See* SpaceX Ex Parte Filing at 8, IBFS File No. SAT-MOD-20200417-00037 (Sept. 14, 2020) (acknowledging that some SpaceX satellites will fail); SpaceX Opp. at 2 (same); *see also* Letter from Amy R. Mehlman, Vice President, U.S. Gov't Affairs & Policy, Viasat, Inc., & Jarrett S. Taubman, Assoc. Gen. Counsel, Gov't & Regulatory Affairs, Viasat, Inc. to Marlene H. Dortch, Sec'y, FCC, at 4 & n.10, IBFS File No. SAT-MOD-20200417-00037 (Jan. 15, 2021) (reporting SpaceX satellite failure rate); Dr. Jonathan McDowell, *Space Report* (Nov. 5, 2020) (documenting SpaceX satellite failures), http://planet4589.org.

of satellites into an already-crowded part of space, the collision risk is particularly acute.[48] The Order largely agreed with these points, acknowledging that failing SpaceX satellites pose a collision risk during the course of the license term of anywhere between 1 in 200 to 1 in 44.5 depending on the number of satellites launched and the precise failure rate. *See* Order ¶¶ 58, 63–64. The Commission thus concluded that this risk is serious enough to require "continued monitoring of constellation reliability." Order ¶ 64.

The Commission has in fact repeatedly catalogued the dangers of orbital debris. It recently warned that "[t]he predicted increase in the number of satellites in orbit requires that orbital debris mitigation be taken seriously by all operators in order to ensure the continued safe and reliable use of space for satellite communications and other activities."[49] And almost two decades ago, it likewise noted that "orbital debris poses a potential risk to the continued reliable use of these orbital regimes for space-based services and operations, as well as to the continued safety of persons and property in space and on the surface of the Earth."[50] It described why "[t]he effects of collisions involving orbital debris can be severe," explaining that "even very small debris objects are capable of producing significant impact damage."[51] And "for objects larger than one centimeter in diameter, the damage caused to functional spacecraft can be catastrophic."[52] The Commission also notably highlighted that "such collisions can produce a large amount of additional debris, which can be dispersed over a wide orbital area."[53]

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[48] Viasat NEPA Reply at 37 (collecting sources).

[49] *Mitigation of Orbital Debris in the New Space Age*, FCC 20-54, at *2 (Apr. 24, 2020).

[50] *Mitigation of Orbital Debris*, 19 FCC Rcd. 11,567, 11,575 (2004).

[51] *Id.*

[52] *Id.*

[53] *Id.*

Despite its longstanding recognition of the serious problems posed by orbital debris, the Commission *still* decided that no NEPA review was needed. Making matters worse, it did so in a single conclusory sentence: "[W]e find that Viasat's arguments about these issues have failed to set forth in detail reasons justifying or circumstances necessitating environmental consideration of these issues." Order ¶ 89. The Commission failed to explain how the risk of collisions leading to orbital debris was serious enough to require "continued monitoring," but not so serious as to require *any* environmental review. *Id.* ¶ 64. Moreover, the Commission's dismissal of Viasat's evidence cannot be squared with its recognition that collision estimates were uncertain because "the data covers only the early stages of constellation deployment" and "[t]ypical spacecraft failure curves tend to show high failure rates at the earliest *and latest* stages of satellite operations deployment." *Id.* ¶ 64 (emphasis added). As discussed above, scientific uncertainty is a reason for the Commission *to* conduct a NEPA review—not to play ostrich and hope that SpaceX's launch of thousands or even tens of thousands of satellites will somehow have no environmental impact.[54]

* * *

In short, given the extensive record of potential environmental effects and the Commission's utter failure to explain its decision, the D.C. Circuit is likely to vacate the Order and direct the Commission to conduct a NEPA review.

II. Leaving the Order in place during the appeal will result in irreparable injury to Viasat and the public.

In addition to Viasat's likelihood of success, the Commission considers "the threat of irreparable harm absent the grant of [a stay]."[55] A party will suffer irreparable harm when the

[54] *See American Bird Conservancy*, 516 F.3d at 1034.

[55] *Hyperion*, 15 F.C.C. Rcd. at 10203.

injury it faces is imminent, and a court cannot restore the status quo ante by unwinding the effects of the injury or providing adequate monetary compensation to the injured party.[56] That standard is easily satisfied here: Both Viasat and the public at large will suffer substantial harms from the Order in the absence of a stay, and those harms are immediate and irreparable.

A. The Order will cause Viasat and the public to face significant, concrete injuries.

If the Commission allows the Order to go into effect, the public will quickly face the environmental harms discussed above. The launch of thousands of Starlink satellites, many of which may soon disintegrate in the atmosphere, will release dangerous chemical compounds, contributing to global warming and depleting the ozone layer. Some pieces of satellites falling to earth can survive reentry and endanger people on the ground.[57] Light reflecting off the satellites will change and pollute the heavens. And the risk of collision and orbital debris will increase with each new satellite launched into already crowded orbits.

In addition, Viasat itself will face a number of imminent injuries as a result of the Order. First, the risk of collisions poses particular risks to Viasat. As the Commission has recognized, collisions involving even small objects "can produce a large amount of additional debris, which can be dispersed over a wide orbital area."[58] That means a collision involving a SpaceX satellite risks creating debris that could have catastrophic and irreparable consequences for Viasat's existing and planned operations. Any additional debris that damages, disables, or destroys Viasat's satellites while traversing LEO or operating in LEO would cause harm to Viasat's

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[56] *See League of Women Voters v. Newby*, 838 F.3d 1, 8 (D.C. Cir. 2016).

[57] This risk has only grown easier to appreciate in recent weeks. *See also Chinese Rocket Debris Set to Hit Earth This Weekend—But No One Knows Where*, NBC News (May 7, 2021), *available at* https://tinyurl.com/RocketDebris.

[58] *Orbital Debris*, 19 F.C.C. Rcd. at 11570.

business. And the presence of failed Starlink satellites that cannot avoid collisions, and any debris created by the fragmentation of a Starlink satellite after a collision, could frustrate Viasat's efforts to deploy its own constellation in LEO—or, at a minimum, significantly increase the costs and complexity of doing so.

Second, even without satellite failures or catastrophic collisions, Viasat will suffer concrete injuries because the Order creates a more crowded orbital environment. As crowding increases, Viasat must expend time and resources ensuring that its own satellites—and particularly its current and future LEO satellites—do not collide or otherwise interfere with SpaceX's. Moreover, because the Order authorizes SpaceX to begin filling up designated physical areas of LEO with many thousands of satellites, the Order constrains Viasat's ability to carry out its own LEO projects in those same orbits.

Third, Viasat will suffer competitive injury from the agency's Order. SpaceX intends to use its environmentally irresponsible constellation to compete directly with Viasat in the market for satellite broadband services. SpaceX's current network is insufficient for widespread commercial availability, but it has explained that once it has enough Starlink satellites in LEO—and it is launching them at a rapid clip—it will be able to move out of "beta" mode, extend its reach geographically, and compete with Viasat for customers directly.[59]

B. The injuries to Viasat and the public are irreparable.

The harms the Order will cause Viasat and the public are not just significant and direct, but also irreparable. As an initial matter, some of the injuries discussed above are irreparable on

[59] SpaceX's CEO has publicly suggested such direct competition, opining that "Starlink poses a hazard to Viasat's profits[.]" Kate Duffy, *Here are the 7 big space companies in the race to build a global satellite-internet network*, Business Insider (April 17, 2021), https://tinyurl.com/DuffySatelliteNetwork (quotation marks omitted).

their face: For instance, a satellite collision cannot be undone and has long-lasting effects, and harmful metallic compounds from a demising satellite cannot be removed from the atmosphere. More generally, the harms described above are irreparable because, once SpaceX launches a satellite, it is impossible to deorbit that satellite without causing or increasing the very harms that necessitate environmental review in the first place.

The competitive harms described above are also irreparable.[60] As discussed, SpaceX intends to compete with Viasat directly for customers. While vacating the Order would stop SpaceX from launching *more* satellites, allowing SpaceX to launch thousands of satellites in the interim would allow SpaceX to argue that it must maintain those satellites it has already launched—and maintain service to customers who have already subscribed. The Commission's past decisions have found irreparable injury to a competitor in a case, like this one, "where the circumstances are such that it would be impracticable for the other party to withdraw service, once established."[61] And even if SpaceX is required to decommission satellites—thereby directly causing environmental harm—it will be impossible to unscramble the market effects already created by wrongful competition from SpaceX.

For these reasons, vacatur at the end of the appellate process would not suffice to remedy the consequences of deployment—particularly because SpaceX intends to launch a significant number of satellites during the timeframe of the appeal. Indeed, SpaceX is deploying satellites authorized by the Commission at an expedited rate. Its next launch—its fourth in the month of

[60] *See, e.g.*, *Abbott Labs. v. Sandoz, Inc.*, 544 F.3d 1341, 1361 (Fed. Cir. 2008) (cataloguing cases holding that loss of market opportunities constituted irreparable injury).

[61] *AT&T*, 13 F.C.C. Rcd. at 14,521.

May—is scheduled for May 26, 2021.[62] Each launch carries approximately 60 satellites into orbit, thereby (1) appreciably increasing the environmental risks outlined above, and (2) expanding SpaceX's operational capacity, allowing it to move its Starlink service toward full readiness (forecast for late 2021).[63]

In addition, none of the harms at issue could be adequately redressed by money damages. The Commission is shielded by sovereign immunity, and Viasat does not have a cause of action against SpaceX for the Commission's improper approval of its modification. *See, e.g.*, *Regeneron Pharms., Inc. v. U.S. Dep't of Health & Human Servs.*, No. 20-cv-10488 (KMK), 2020 WL 7778037, at *4 (S.D.N.Y. Dec. 30, 2020) (collecting cases holding that party suffers irreparable injury when sovereign immunity bars it from recovering for its losses).

For all these reasons, the irreparable injury to Viasat warrants a stay pending appeal.

III. A stay will not substantially injure SpaceX.

The Commission next considers "the degree of injury to other parties if relief is granted." *Hyperion*, 15 F.C.C. Rcd. at 10203. Here, a stay merely maintains the status quo pending appeal. If the D.C. Circuit ultimately upholds the Commission's NEPA ruling, the only effect of the stay would be to delay SpaceX's ability to launch satellites pursuant to the Order by some number of months. Any harm to SpaceX from that delay it is far outweighed by the irreparable injuries to Viasat and the public discussed in the preceding section if a stay is denied—especially given the high likelihood that the D.C. Circuit will vacate the Commission's Order altogether.

In that respect, this case mirrors the stay the Commission issued in *AT&T*. There, the

[62] *See Launch Schedule*, Spaceflight Now, *available at* https://spaceflightnow.com/launch-schedule/ (last visited May 19, 2021).

[63] *See* Trevor Mogg, *Elon Musk Reveals When Starlink Internet Service Will Likely Exit Beta*, Digital Trends (Apr. 16, 2021), *available at* https://bit.ly/2T9xXn5 (last visited May 20, 2021).

Commission recognized that an interim "standstill order" would prevent the party opposing the order, "for a time," from offering particular services and receiving payments for those services. *AT&T*, 13 F.C.C. Rcd. at 14,521. But the Commission explained that "[t]his delay in realizing these benefits does not outweigh" the substantial irreparable injuries demonstrated by the party seeking the stay. *Id.* The same principle applies here: A mere delay in SpaceX's ability to expand its commercial operations does not overcome the significant harm that Viasat and the public will face by allowing that expansion to proceed without adequate environmental review. Moreover, if this Court stays its Order, Viasat will work with the Commission and SpaceX to expedite the appeal, mitigating the extent of any delay.

IV. A stay is in the public interest.

Because there is a "compelling public interest in the enforcement of NEPA," the D.C. Circuit has held that, "when an action is being undertaken in violation of NEPA, there is a presumption that injunctive relief should be granted against continuation of the action until the agency brings itself into compliance"—a presumption that applies equally to stays of agency action.[64] This presumption recognizes that "a project should not proceed, with its often irreversible effect on the environment, until the possible adverse consequences are known"; instead, agencies and courts must "stop projects that are in the process of affecting the environment when the agency is in illegal ignorance of the consequences."[65] The presumption in favor of injunctive relief also reflects the fact that a stay "preserve[s] for the agency the widest freedom of choice when it reconsiders its action after coming into compliance with NEPA, e.g., after finding out about the possible adverse environmental effects of its action." Waiting until a

[64] *Realty Income Tr.*, 564 F.2d at 456; *see Cuomo v. U.S. Nuclear Regulatory Comm'n*, 772 F.2d 972, 976 (D.C. Cir. 1985) (applying presumption in the context of a stay request).

[65] *Realty Income Tr.*, 564 F.2d at 456.

project is well underway to comply with NEPA risks turning NEPA compliance into "an empty gesture," because "the momentum of additional work and investment" may "bind the agency to its initial decision."[66]

Applying these principles, the public interest strongly favors a stay. As discussed above, the D.C. Circuit is likely to hold that the Order fails to comply with NEPA. SpaceX's launches risk precisely the "irreversible effect on the environment" that, as the D.C. Circuit recognized, warrant a stay.[67] And allowing SpaceX to launch satellites pursuant to the Order pending judicial review would likely lead to the launch of hundreds—if not thousands—of additional satellites before the D.C. Circuit could decide whether NEPA review is required. That would, in turn, risk reducing any NEPA review ordered by the D.C. Circuit to "an empty gesture."[68] The public interest thus strongly favors a stay so that the D.C. Circuit can at least *consider* whether *some* environmental assessment is required.

CONCLUSION

The Commission should stay its Order until the D.C. Circuit decides whether the Commission complied with NEPA.

[66] *Id.* at 456, 457.

[67] *Id.*

[68] *Id.*

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CERTIFICATE OF SERVICE

I, William M. Jay, hereby certify that on this 21st day of May, 2021, I caused to be served a true copy of the foregoing Request for Stay Pending Judicial Review via first-class mail upon the following:

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